

*Boletus edulis* Bull., to our great surprise, was scarcely seen all summer. *Boletus affinis* Pk. was abundant everywhere.

The two species which were most abundant were *Boletus chromapes* Frost and *Boletus bicolor* Pk. The latter species was particularly common along the sandy roads, where its dark red pilei might be seen often in large clumps attracting the eye of every passer-by.

CLEVELAND, OHIO.

## REMARKS ON THE USE OF FUNARIA HYGROMETRICA IN BOTANICAL TEACHING

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The common cord-moss (*Funaria hygrometrica*) figures so prominently in well-known botanical text-books that little or nothing needs to be said as to the characters by which it may be recognized. It may be remarked, however, that this moss grows by preference on moist sandy soil in either open or lightly shaded places and that it thrives with special luxuriance where such soil has been recently burned over. Though the leaves of the living *Funaria* have long been famed for the beauty and clearness with which their chloroplasts are exhibited, the gametophyte, on account of the shortness of the stem, is perhaps not so well adapted for general study in the laboratory as is that of some of the larger mosses like the Mniums. Yet, for spring classes, *Funaria* may be relied upon to furnish material for the demonstration of living spermatozoids. The clusters of antheridia may be recognized in the living plants with the naked eye or with the aid of a hand lens. They are of a yellowish or brownish color owing to changes in the chloroplasts of the cells composing the walls of the maturing antheridia, and each cluster is surrounded by leaves in such a way that the whole is rosette-like in form. In the region of New York, the antheridia are mature late in April or early in May. As in dealing with fern prothalli, the spermatozoids are set free with greater certainty if the plants are kept rather dry for a day or two before the antheridia are brought into a drop of water for examination.

But certain characters of the sporophyte, notably the beauty of the peristome and the ease with which it may be made to illustrate the hygroscopic nature of moss peristomes in general, are what especially commend *Funaria* for use in botanical instruction. It is, I believe, a sound principle in the pedagogics of natural history to select illustrative material now and then which is bound to excite the interest and admiration of the most indifferent pupil. It can be readily understood that in its abuse this motive might lead to a selection which would interfere with a proper perspective of the subject as a whole, but, in the present case, the features in which the peristome of *Funaria* differs from the type most common in the mosses are of little importance to the general student.

For the best demonstration of the workings of the peristome, the plants should be collected and dried when the capsules are mature and brown and a little before the opercula are ready to fall, which, in the neighborhood of New York, is mostly in June and July. In this dried condition, they may be preserved indefinitely. When the study of the matured sporophytes is begun, some of them, still attached to the gametophytes, may be placed in a glass of water and the student's attention directed to the untwisting of the seta as it absorbs the water. Then, on holding one of them in the air a few moments, the seta is seen to twist again. These movements of the seta under changing conditions of moisture were, with little doubt, what suggested the specific name *hygrometrica* to Linnaeus. Finally, the probable relation of these movements to the dispersal of the spores may be suggested to the student if he fails to think of it himself. The amount of soaking required to remove the operculum depends largely on the degree of maturity of the capsule at the time of gathering. The act of throwing off the operculum and the relation of the annulus to the process can best be observed if a few capsules are placed in a large drop of water on a glass slide or in a shallow watch-glass. After the removal of the operculum and annulus, the capsule may be allowed to dry and if it can then be balanced on its back with the mouth directed upward, the peristome as a whole may be examined to advantage by reflected light under the ordinary lower powers of the compound microscope.

If the peristome is in a normal condition, it will be found to be extremely sensitive to changes in moisture, responding perhaps to the ordinary breathing of the observer or at least to a gentle blowing. As in mosses in general, the teeth draw inward and close together on absorbing moisture and execute the reverse movements on drying. The equilibrium of a capsule balanced in the manner described is unstable at best, but it can be easily rendered stable and permanent by the use of various adhesives. Professor Francis E. Lloyd suggested to the writer the use of paraffin for this purpose and this has proved a convenient medium. A very small quantity of paraffin is melted on a glass slide and the capsule is placed in contact with it and held in position, mouth upward, until the paraffin hardens. Preparations made in this way may be laid aside for future use. The matured capsule, peristome, annulus, etc., may of course be subjected to further study in the usual manner, not neglecting the important fact of the presence of stomata, which may be found near the base of the capsule.

Formalin-preserved material of *Funaria* with young sporophytes is valuable, among other things, for demonstrating the structural independence of gametophyte and sporophyte. With the right kind of a pull, the young sporophyte may often be separated from the gametophyte in such a way that a microscopical examination of its foot will show that the act was accompanied by no rupture of cells. But for this special purpose *Funaria* is perhaps no better than many other mosses.

### SHORTER NOTES

A NEW HAWKWEED FROM FLORIDA.—Contained in an interesting collection of plants made in the vicinity of Tallahassee, Florida, by Mr. N. K. Berg, and received from him several years ago by Dr. Small, is a single well-preserved specimen of a hawkweed which differs widely from any species known to me, and I can find no plant described which answers to its peculiar characters. In a genus of so many species, and these so very widely distributed there is chance that this plant may have been recorded